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# SCIENTIFIC INFORMATION REPORT

Electronics and Engineering

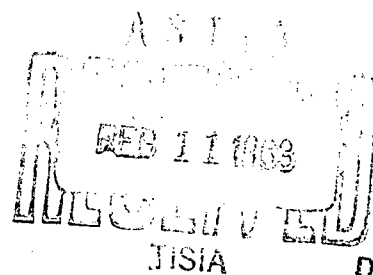
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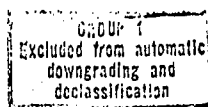
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## **W A R N I N G**

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SCIENTIFIC INFORMATION REPORTElectronics and Engineering (25)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly; the sixth series, Organization and administration of Soviet Science, is issued every 6 weeks; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

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I. ELECTRONICS

Annotated Index Selections

1. Abstracts on Radio Electronics and Radio Engineering

Annotirovanny Ukazatel' Literatury po Radioelektronike  
(Annotated Index of Literature on Radio Electronics),  
No 21 and 22, 1962

Following are translations of selected abstracts from the above source. Numbers in brackets indicate the issue from which each abstract was selected.

1. "Infrakrasnyye luchy v voyennom dele (Infrared Rays in Military Affairs), by V. Ye. Kichka; Moscow, Oborongiz Publishing House, 1962, 176 pp, illustrated. [21]

"A popular style is used to present problems of the physics of infrared rays, describe instruments used in infrared technology for various military applications, and present information of a reference nature. The author describes the characteristics of visible and infrared rays, methods of generating infrared rays and their propagation in the atmosphere, the photoelectric action of light, and luminescence. The author describes, for the most part, instruments which were used in the last war. The concluding chapter is devoted to sources of electrical energy for night viewing instruments. The book should be of interest to a broad category of well-prepared readers who wish to familiarize themselves with this branch of technology.

2. "Radiooborudovaniye samoletov (Aircraft Radio Equipment), by N. A. Kaganovich; Moscow, Oborongiz Publishing House, 1962, 200 pp, illustrated. [21]

"This book is intended to familiarize the reader with the apparatus and principles of operation of contemporary radio communication, radio navigation, and blind landing equipment used in aircraft. It contains the general characteristics and block and schematic diagrams of this equipment, as well as diagrams of the more widely used individual units. The author examines power supplies and methods of decreasing radio interference in aircraft, types and properties of antennas for radio communication, and navigation apparatus. In addition, the propagation of radio waves in the atmosphere is briefly discussed. The book is a textbook for aviation technical schools.

3. "Korotkovolnovyye anteny (Short-Wave antennas), by G. Z. Ayzenberg; Moscow, Svyaz'izdat Publishing House, 1962, 815 pp, illustrated, [21]

"This monograph is the result of a revision of the book Anteny dlya magistral'nykh korotkovolnovykh radiosvyazey (Antennas for National Short-Wave Radio Communication), published in 1948. This new work was written with consideration for the progress which has recently been made in short-wave antennas. A great deal of material is presented on cophased wide-band antennas and, in particular, on cophased antennas with aperiodic reflectors, travelling-wave antennas with active coupling impedance, logarithmic antennas, wide-band shunt dipoles, and others. Material on rhombic antennas has been substantially expanded. The book gives data on rhombic antennas with broad angles ( $150^\circ$ ) and graphic material on the directional properties of antennas with consideration for the parallel component of the field intensity vector. The question of matching two rhombic antennas on a common foundation is examined. The monograph includes a chapter on single-sire travelling-wave antennas, and a new chapter has been written on the comparative noise-immunity of various receiving antennas.

4. "Uskoriteli (Accelerators); Moscow, Gosatomizdat Publishing House, 1962. [21]

"A. G. Tragov, 'Investigation of the Equivalent Circuit Parameters of a Thick Diaphragm for  $E_{01}$  Waves,' pp 161-173, illustrated.

"Relationships are derived for the equivalent circuit parameters of a diaphragm using the Schwinger variation method, and the relationship of the parameters of the circuit to the selection of comparison functions is investigated. As a partial case of a thick diaphragm, the author examines the problem of coupling two circular wave guides with similar cross-sections at frequencies not greatly different from the critical frequency. Graphs are given for determining the equivalent circuit parameters of a diaphragm, and measurement methods are described.

5. "Spravochnik po elektronnykh priboram (Handbook on Electronic Instruments), by D. S. Gurlyayev; Kiev, Gostekhnizdat Publishing House of the Ukrainian SSR, 1962, 492 pp, illustrated. [21]

"This handbook contains basic information on the parameters, characteristics, standard operating conditions, and certain standard circuit applications for the majority of domestically produced electronic instruments. The handbook is written for a broad category of radio amateurs concerned with the design, adjustment, and repair of different types of radio apparatus and may be useful to engineers and technicians in the radio engineering industry.



6. "Organizatsiya tekhnicheskoy podgotovki proizvodstva v priborostroyeni" (Organization of Technical Procedures for Production in the Instrument Building Industry), by A. I. Slonim; Leningrad, Sudpromgiz Publishing House, 1962, 180 pp, illustrated. [21]

"The basic problems of organizing and planning technical procedures for production in instrument-building enterprises are presented in this book. The organization of design and technological procedures is considered, taking into account the work experience of plants and scientific-research institutes of the country. The author describes the order in which new parts are designed and their manufacturing technology. The book is written for engineering and technical workers of plants and design and scientific research organizations of the instrument-building industry. It may also be of use to instructors and students of higher technical schools.

7. "Luchshiye konstruktsii 16-y vystavki tvorchestva radiolyubiteley" (Best Designs at the 16th Exhibition of the Creative Works of Radio Amateurs); Moscow, DOSAAF Publishing House, 1962, 160 pp, illustrated. [22]

"This collection consists of four sections: 'Short-Wave and Ultra-short-Wave Apparatus' (descriptions of short-wave transmitters, ultrashort-wave radio sets, ultrashort-wave receivers, and others), 'Television' (the 'Mechta' and 'Feya' television receivers and a test signal oscillator), 'Radio Receiving and Sound Recording Apparatus' (the 'Oktyabr' apparatus, a straight amplification receiver, and a portable magnetic sound recorder), and 'Measuring Apparatus' (signal oscillator, portable oscillograph, and others). The descriptions of the exhibits characterize the basic trends of that section of the exhibition in which they were demonstrated. The descriptions contain an account of the general designation of the exhibit and its principle of operation, as well as a schematic diagram and electrical data of the parts.

8. "Metody kvantovoy teorii polya v statisticheskoy fizike" (Methods of Quantum Field Theory in Statistical Physics), by A. A. Abrikosov, L. P. Gor'kov, and I. Ye. Dzyaloshinsky; Moscow, Fizmatgiz Publishing House, 1962, 443 pp, illustrated. [22]

"Quantum statistical physics is the study of the property of systems consisting of a large number of particles at low temperatures. Recently, great progress has been made in this area of physics, chiefly with the application of mathematical methods of quantum field theory. The basis of these methods -- diagram technique -- possesses a high degree of automatism and clearness. Using this technique, it was possible to solve a series of interesting physical problems which had previously been inaccessible to examination. The book presents these new methods and the basic results obtained in recent years. The book is written for scientific workers and physicist aspirants, as well as for students of senior courses specializing in the fields of theoretical physics, solid state physics, and low temperature physics.

9. "Radioreleynaya svyaz" (Radio Relay Communications), by N. M. Izyumov; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 96 pp, illustrated. [22]

"This book examines the fields of the present application of radio relay communication and describes the components and principles of operation of radio relay stations. The possibilities of providing radio relay communication with great distances between stations are pointed out. The material is intended for trained radio amateurs.

10. "Izmeritel'nyye skhemy s samovozbuzhdeniyem" (Measuring Circuits With Self-Excitation), by Dvinskikh; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 48 pp, illustrated. [22]

"This brochure presents basic information on measuring circuits with self-excitation, which are distinguished from presently used circuits by the absence of an oscillator. The circuits are particularly promising for measurements in automatic and highly sensitive equipment. The brochure is written for specialists concerned with the development and exploitation of measuring techniques.

11. "Elektromagnitnoye polye kak vid materii" (The Electromagnetic Field As a Form of Material), by O. B. Bron; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 260 pp, illustrated. [22]

"The purpose of this book is to facilitate the propagation of the concepts of an electromagnetic field as a form of material. It briefly examines the history of the problem and gives present views on the field; important conclusions which have arisen from the new concepts of the field are discussed. Attention is devoted to the question of the means of motion of a field both in simple systems, as well as in electrical machinery and apparatus and on the speeds of this motion. The book is written for engineering and technical workers familiar with the principles of electrical and magnetic phenomena.

12. "Teoriya postroyeniya releynykh skhem" (Theory of the Design of Relay Circuits), by A. N. Yurasov; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 119 pp, illustrated. [22]

"The author briefly presents the basic aspects of the theory of relay circuits, gives simplified derivations of basic formulas, and examines methods of relay circuit transformation, the design of some special types of circuits, and the synthesis and analysis of single-action and multiple-action circuits. The large number of examples facilitates comprehension of the material and makes it possible to use the book in practical work on the design of relay equipment. The book is written for a broad category of engineering and technical workers who are just beginning the study of relay circuits and does not require a knowledge of any special areas of mathematics.

13. "Tekhnologiya ferritov (The Technology of Ferrites), by L. I. Rabkin and others; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 358 pp, illustrated. [22]

"This book examines the structure of magnetic semiconductor-ferrites, presents their manufacturing technology, and describes basic methods of measuring their magnetic and electrical properties. The book is intended for a broad category of engineering and technical workers concerned with the production of ferrites and their application in electrical communications, broadcasting, television, telemechanics, and other fields of engineering.

14. "Tonkiye plenki v tekhnike sverkhvysokikh chastot (Thin Films in Superhigh Frequency Technique), by V. V. Slutskaya; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 399 pp, illustrated. [22]

"Problems of the physics, manufacturing technology, and application of thin metallic and certain nonmetallic films are systematically presented in this book. The distinguishing characteristics and physical properties of these films are examined. The author gives the designs, characteristics, and parameters of various thin film elements (load resistances, bolometers, thermoconverters of local absorbers for traveling-wave tubes) used in superhigh frequency technique. The book may be of use to engineers and technical workers of scientific research and production organizations, as well as to students of higher technical schools as a supplementary aid in the study of the appropriate courses of electric vacuum and superhigh frequency techniques.

15. "Tenzometricheskiye mosty (Tensometric Bridges), by O. Khorna, translated from Czech; Moscow/Leningrad, Gosenergoizdat Publishing House, 1962, 336 pp, illustrated. [22]

"Measuring bridge circuits used in wire strain gauges are examined in this book. The author first considers the theory of a four-arm measuring bridge and subsequently analyzes methods of designing different bridges (sensitivity, error, modifications, etc.). The author also gives the circuits of electronic amplifiers used by a number of firms. This book completes the collection by Zd. Ruzga entitled Provolochnyye tenzometry Soprotivleniya (Wire Resistance Strain Gauges), published by the Gosenergoizdat Publishing House. The book is intended for engineers and technicians working in the field of measurements both in industry and in scientific research and design organizations.

16. "Izmereniye parametrov antenn (Measurement of Antenna Parameters), by A. Z. Fradin and Ye. V. Ryzhkov; Moscow, Svyaz'zdat Publishing House, 1962, 316 pp, illustrated. [22]

"The authors examine the measurement of antenna parameters, deformations leading to changes in the parameters, and instruments for the constant control and regulation of antenna parameters used in the automatic control of radio station equipment. Methods of measuring input resistance, the parameters of feeder lines, and field intensity and methods of recording the directivity patterns of antennas and measuring gain factors are examined in detail.

17. "Mnogoprogrammnoye veshchaniye po radiotranslyatsionnoy seti (Multi-Program Broadcasting by Radio Relay Networks), by L. Ya. Kantor; Moscow, Svyaz'izdat Publishing House, 1962, 60 pp, illustrated, [22]

"The book gives the basis and a description of the system and equipment for three-program broadcasting developed by the Scientific-Research Institute of the Ministry of Communications USSR in 1960-1961 and now located in the stage of introduction. The special attachment for receiving broadcasts transmitted by wire through the radio relay networks is described. Brief recommendations are made on the operation of radio relay networks for three-program broadcasting.

18. "Indikatornyye ustroystva radiolokatsionnykh stantsiy (Indicator Devices for Radar Stations), by V. M. Rakov; Leningrad, Sudpromgiz Publishing House, 1962, 532 pp, illustrated. [22]

"In this book, the author examines the complex of problems relating to methods of detecting and displaying signals in pulse radar stations. The author discusses methods of determining coordinates and area of coverage, methods of separating signals from a noise background, the properties of cathode-ray tubes, principles of indication, and methods of designing and characteristics of different types of indicator devices. The possibilities of using special cathode-ray tubes with charge storage, sign display, color images, etc. are examined. The book is written for engineers and technicians working in the field of radar and may also be useful as a study aid for students in the appropriate higher technical schools.

19. "Nastroyka i ispytaniye radiolokatsionnoy apparatury (The Adjustment and Testing of Radar Apparatus), by Ya. I. Berman and B. M. Gol'din; Leningrad, Sudpromgiz Publishing House, 1962, 323 pp, illustrated. [22]

"The procedure for adjustment of radar sets, their individual components, and instruments is described in this book. Certain chapters of the book are devoted to the adjustment and operation of ship radar stations. The order for the control and testing of radar stations and their components is examined. The authors discuss the most characteristic and frequently encountered faults of radar stations and make recommendations for their correction. The book is intended for workers of the radio engineering industry, students of higher educational institutions and technical schools, and radar service personnel.

20. "Tekhnologiya gal'vanotekhniki (Electroplating Technology), by A. M. Ginberg; Leningrad, Sudpromgiz Publishing House, 1962, 280 pp, illustrated. [22]

"This book examines present technological processes for the preparation and application of galvanic, anode, and chemical coatings, as well as the more frequently used processes of electroforming used in instrument building and machine building. Detailed descriptions are given of zinc-, cadmium-, copper-, silver-, nickel-, and chromium-plating. Due to the increasing application of aluminum, magnesium, and titanium as structural materials, the author devotes particular attention to problems of the application of coatings on these metals and their alloys. The book is written for foremen and workers of electroplating shops.

21. "Sinkhronno-sledyashchiye sistemy povyshennoy tochnosti (Synchronous-Servo Systems With Greater Precision), by A. A. Akhmetzhanov; Moscow, Oborongiz Publishing House, 1962, 209 pp, illustrated. [22]

"In this book, the author presents methods for the design of various synchronous-servo systems with greater precision, including servo systems with electrical reduction. Single-channel systems with different types of synchronous drive and two-channel systems with mechanical and electrical reduction are examined. Examples are given of the calculation of dynamic characteristics, analysis of errors, and methods of testing systems under static and dynamic conditions. The book should be of practical interest to industrial engineers and will be useful to students of higher technical schools.

22. "Pilotazhno-navigatsionnyye pribory (Piloting-Navigational Instruments), by V. G. Denisov and R. N. Lopatin; Moscow, Voenizdat Publishing House, 1962, 111 pp, illustrated. [22]

"The psychophysiological and technical conditions involved in piloting an aircraft according to instruments are examined in this book. In addition, the authors discuss the requirements for new piloting-navigational instruments and systems intended to facilitate the guidance of an aircraft by the pilot. The book is written for flying and engineering-technical personnel in all branches of aviation and for those concerned with the development and exploitation of instruments used in civil and military aircraft. Material from the open foreign and Soviet literature is used in the book.

23. "Materialy dlya remonta radiosredstv (Materials for the Repair of Radio Facilities), by Z. G. Rapoport and K. Ye. Bobrov, a concise handbook, Voenizdat Publishing House, 1962, 256 pp, illustrated. [22]

"This handbook contains the fundamental characteristics and grading of materials used for the repair of radio engineering facilities. The grading encompasses the more frequently used designs and cross-sections from those which have been standardized according to state standards and recommended for use in the radio engineering industry. The book is written for engineering and technical personnel of design bureaus, the engineering sections of repair enterprises, foremen and workers directly involved in repair work, and persons concerned with material-technical supply.

24. "Termicheskiye svoystva stekla (The Thermal Properties of Glass), by N. N. Yermolenko; Minsk, Publishing House of the Ministry of Higher, Secondary Specialized, and Vocational Education of the Belorussian SSR, 1962, 140 pp, illustrated. [22]

"This book presents a general account of investigations on the study of thermal expansion, softening temperature, and heat resistance of glasses which were conducted in the USSR and abroad. The first chapter considers problems of the theory and practice of the manufacture and study of the thermal properties of glass; the second chapter examines the relationship of thermal expansion, softening temperature, and heat resistance of glasses of varying degrees of hardness to their chemical composition; the third chapter describes methods of computing the thermal expansion of glass. The book is written for scientific workers, students, engineers, and technicians in the glass industry and in those branches of industry where glass is used.

Communications

2a. Low Quality of Soviet Television Receivers

"Complaints of Television Receiver Owners," by A. M. Podol'skiy;  
Moscow, Vestnik Svyazi, No 11, Nov 62, pp 20-21

The article contains the following passages:

"An analysis has disclosed that television receivers of many trade-marks often fail during the first 5 days of operation. During the 6-month quaranty period; many television receivers get out of order as often as 10 to 15 times. The owners of such television receivers justly complain to the manufacturers and are asking for replacement of the defective sets.

"It is known that 90% of television receiver failures is due to the poor quality of vacuum tubes, resistors, and capacitors.

"Last year there was a shortage of radio tubes 6Ts10P, 6Pl3S, and 1Ts11P. Although these tubes have appeared on the market now, the procurement of radio tubes 6N14P, 6Pl4, 6N1P, 6Pl5, and 6Pl8 has become more difficult. The quality of some of the radio tubes is low."

2b. Soviet Three-Dimensional Color Television

"Three Dimensional Color Television"; Budapest, Nepszeru Technika, Vol 11, No 11 Nov 62, p 344

Workers at the Leningrad Electrotechnical Institute have developed television equipment to transmit three-dimensional color pictures. The equipment can be used for industrial research, scientific experiments, and showing medical operations. The receiver consists of two screens set at a 90 degree angle; a half-silvered mirror between the two screens combines the two pictures into one with a depth effect.

3. Unsatisfactory Performance of ZhR-t Train-Borne Radio Station

"Constructional Drawback of ZhR-5 Radio Station," by  
V. G. Kravtsov; Moscow, Avtomatika, Telemekhanika i Svyaz',  
No 10, Oct 62, pp 42-43

The recently designed and now series manufactured, train-borne radio station ZhR-5 does not satisfy such important requirements as economy, reliability in operation, simplicity, and convenience of servicing.

During the first year of its operation on the Omsk sector, a series of important drawbacks of the ZhR-5 station was revealed. The most important drawback of this station is the excessive power consumption, which might be as high as 240 w. But such a power demand cannot be satisfied by the conventional locomotive turbogenerator TG-1R, the generating capacity of which is only 150 w. The stabilizer TSN-250 of the station overheats during operation, and the capacitors often fail. The transformers of the station also generally overheat even when the temperature of the air is low. The noise suppressor incorporating tube 6N2P is very erratic in its performance.

#### Components

#### 4. Richardson Plot For Semiconductor-Type Hot Cathodes

"On the Nature of the Temperature Dependence of the Work Function of Hot-Cathodes of the Semiconductor Type," by B. V. Bondarenko and B. M. Tsarev, Trudy Moskovskogo Fiziko-tekhnicheskogo Instituta (Proceedings of the Moscow Physicotechnical Institute), No 8, 1962, pp 14-20 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 4-3-6 i)

The Richardson plot for semiconductor hot cathodes has a unique character, the lines being much steeper at low temperatures than at high temperatures.

It is shown here that the behavior of the lines of the Richardson plot for semiconductor-type hot cathodes can be unequivocally explained by the course of the electrochemical potential in a wide range of temperatures. Measurements of this potential in various temperature ranges afford the possibility not only of explaining the physical sense of the values obtained from the steepness of the Richardson lines, but also of using the experimental data to compute the values of the external work function, the ionization energy of the impurity element, and its concentration.



Instruments and Equipment5. Field Intensity Metr for Frequency Range of 50-400 Mc

"Calibrating Device for Testing Field-Intensity Meters Operating in the Range of 50-400 Mc," by V. S. Buzinov; Moscow, Izmeitel'naya Tekhnika, No 11, Nov 62, pp 45-48

The All-Union Scientific-Research Institute for Physicotechnical and Radio Engineering Measurements designed a master instrument OINP-50-400 for testing field intensity meters operating in the frequency range of 50-400 Mc. The new instrument consists of two main parts -- a signal generating and radiating device and a master receiving antenna. In the frequency range of 50-150 Mc, a set of replaceable dipole antennas is used for fixed frequencies of 50, 75, 100, and 150 Mc; and in the frequency range of 150-400 Mc, a logarithmic antenna is used which permits smooth adjustment for the whole range. The radiated power is controlled by impedance meter IPSK-2 connected to the transmitting antenna. At the output of the IPSK-2 coupler is connected the thermoconverter TVB-3. The thermoelectric emf is measured with the aid of a class 0.5 millivoltmeter. The master receiving antenna is in the form of a resonance tuned dipole of known parameters.

Systematic and random errors of the OINP-50-400 instrument are about  $\pm 4\%$ , which is within permissible limits.

6. Instrument for Testing Paramagnetic Resonance

"Millimeter Range Radiospectroscope With Pulsed Source of Magnetic Field," by G. M. Zverev, I. B. Krynetskiy, D. M. Litvak, P. V. Chernov, and A. K. Shevchenko, Scientific-Research Institute of Moscow State University; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 132-134

Construction and operation of radiospectroscope able to investigate paramagnetic resonance on frequencies up to 100,000 Mc are described. In this device, the microwave oscillations first pass through an attenuator before entering a round wave guide, inside of which is placed the examined material. A section of the wave guide is surrounded by a solenoid which produces a uniform magnetic field around the tested sample. The high-frequency energy, after passing over the investigated sample, is detected by a crystal, amplified and fed to the input of triggered oscillograph. The trigger sweep is initiated by a special control system after discharge of the capacitor bank through the solenoid. The control system has provisions for changing the trigger delay time, thus permitting photograph of various sections of the spectrum.

The wave-guide system does not have a cavity resonator because at the frequencies of 50,000 to 100,000 Mc it becomes small and the quality factor drops. Such a resonator-free wave-guide system has a wide bandpass. Actual cross section of the wave guide is  $3.4 \times 7.2$  mm. The wave guide and solenoid are immersed in a vessel with liquid nitrogen. The solenoid is fed from a bank of 2 mf electrolytic capacitors and produces a magnetic field up to 80,000 oersteds. Paramagnetic resonance lines are observed in the form of narrow pulses, which are amplified before being fed to an oscillograph with a 10-Mc bandpass.

The paramagnetic resonance spectrum can be observed in sections by varying speed and sweep delay and magnetic field intensity.

## 7. Wide-Band Cathode-Ray Tube

"Wide-Band Cathode-Ray Oscillograph Tube," by Yu. A. Akimov and B. M. Stepanov; Moscow, Pribory i Tekhnika Eksperimenta, No 5, Sep/Oct 62, pp 128-130

A cathode-ray tube designed to take oscillographic records of individual fast process with time resolution of  $3 \cdot 10^{-10}$  sec is described in some detail. The beam deflecting system of this tube is in the form of a line with distributed constants. The deflecting plates are in the form of a ribbon line with a wave impedance of 75 ohms. The end of this ribbon line is matched with a coaxial line passing through the glass bulb. Such a deflecting system is free of resonance characteristics and does not display any appreciable signal reflection at the junction of coaxial and ribbon lines. This two-beam tube has two identical electron guns and deflecting systems. The electron gun is operated at an accelerating voltage of 20 kv which ensures a trace width of about 0.3 mm and a photographing speed of 50,000 km/sec. Diameter of the screen is 170 mm. To eliminate any possible distortions of the signal, the tube does not utilize after-acceleration of the beam. The electron transit time through the deflection system of the tube is  $3 \cdot 10^{-10}$  sec.

The upper limit of registered frequencies is 1,500 Mc. The tube sensitivity with respect to plate deflecting signals is 0.045 mm/v, thus permitting signals of any polarity with amplitude up to 1,000 v to be registered.

Ultrasonics8. Ultrasonic Inspection of Rolled Products

"Flying Beam"; Leningrad, Leningradskaya Pravda, 15 Nov 62, p 4

The ultrasonic inspection device, UZUL, for detection of internal flaws in rolled plates and sheets was designed jointly by the Chair of Electroacoustics and Ultrasonic Techniques of the Leningrad Electrical Engineering Institute and the Nizhne-Tagil'skiy Metallurgical Combine.

For the first time in the world practice, it became possible to disclose internal defects with the aid of a "flying beam." This device, installed at the Nizhnyy-Tagil plant, automatically outlines the defects at any desired scale.

Dr A. V. Fremke, deputy rector of the institute, stated that the Scientific Council will submit this device for competition for the Lenin prize in 1963.

9. Ultrasonic Device Used To Estimate Meat Yield of Live Pigs

"estimation of Total Yield of Lard and Meat of Live Cattle With the Aid of Ultrasonics," by P. Ye. Ladan and G. F. Bondarev; Moscow, Svinovodstvo, No 11, Nov 62, pp 30-34

The Chair of Animal Husbandry Animal, Chair of Donskoy Agricultural Institute, has conducted a series of experiments to develop methods for estimating the meat-lard yield of live pigs. It was found that the ultrasonic method for estimating the thickness of fat layer of live pigs was the most accurate. The ultrasonic device TUK-2 was used in this research.

## II. ENGINEERING

Aerospace Research10. Collection on Automatic Checkout of Missile and Aircraft Equipment

Avtomaticheskaya Proverka Oborudovaniya Samoletov i Raket (Automatic Checkout of Aircraft and Missile Equipment), collection of articles, translated by I. D. Alimov, edited by V. A. Bodner, Publishing House of Foreign Literature; Moscow, 1962, 216 pp

This collection, based on translations of articles published in the foreign periodical literature from 1958 through 1960, is devoted to problems of the automatic checkout of aircraft and missile equipment. The book is intended for specialists concerned with the exploitation of aircraft and missile equipment, for industrial workers who use automatic control systems in checking finished products, and for instructors, aspirants, and students of higher educational institutions.

The editor prefaces the book with a description of the principles of reliability and the problems involved in the automation of equipment control processes. "These problems include: (a) the generation of test signals and their transmission to the object of control; (b) measurement of the response or output signals of the object; (c) comparison of the response with standard signals; (d) analysis of the results of the comparison and transmission of the resultant signal to a programmer for continuation or cessation of the checkout process; (e) transmission of signals to search for the fault; and (f) indication or display of the results of checkout." Due to the complexity of the automatic control system, a self-check operation is also necessary. "To perform all the above operations, the system must include: (1) a signal generator, (2) a programmer, (3) a logic device, (4) a self-check system; and (5) a display unit." The editor examines the above elements of an automatic control system in detail, explaining the purpose of each element and its principle of operation.

The editor's foreword notes that the articles in this collection have been selected from the periodical literature and from the works of conferences so as to include the fundamental problems of the automation of checkout procedures with a minimum of repetition of the general concepts. The editor points out that "unfortunately, of all the materials published in the foreign literature, rather few contain accounts of the design principles and mathematical treatment of the problem of automatic control."

The rapid development of this area of automatic control is, according to the editor, clearly manifested in the appearance of a large number of works during the preparation of this collection (1961). These include articles describing equipment for the automatic checkout of the Skybolt, remote controlled drones, and civil aircraft, as well as information on the use of automatic checkout procedures for the complex equipment of flight trainers and simple ground electronic installations.

A sampling of the articles which were translated for this collection follows: "Multipurpose Automatic Systems for the Checkout of Integral Bomber-Navigational Systems and Missile Guidance Systems," "Automated Testing Equipment for Weapon Systems," "A Mobile Apparatus for the Automatic Checkout of the Bomarc System," "Equipment for the Automatic Checkout of the Polaris Missile," and "The Demon and Norscan Checkout Installations."

[Comment: The editor explains that, since the terminology in this new branch of engineering has not yet become standardized, the collection may contain some terms which do not appear to be appropriate translations of the English. A comparison was made between one of the original articles ("Checkout and Countdown of the Larger Space Probe Missiles," by W. O. Campbell; New York, Proceedings of the IRE, Vol 48, No 4, April 1960, pp 728-734) and the Russian translation. The terms "space probe missile" and "missile" were translated as "kosmicheskaya raketa" and "raketa," respectively. On this basis, the term "missile" has been used as a translation of the Russian "raketa" in the present item, although the Russian word "snaryad" is, in a strict sense, closer to "missile."

The translated articles are devoid of any editorial comment with the exception of one footnote used to clarify a point in the text.]

### Computers, Automatic Control Engineering

#### 11. Automatic Ferrite Core Sorting Device

"A Reliable Checker"; Kiev, Pravda Ukrainy, 2 Dec 62, p 1.

The ferrite cores used in the memory of electronic computers are extremely small, and their sorting takes a longer time than their production. This bottleneck has been successfully eliminated by personnel of the laboratory of nuclear electronics of the Institute of Physics, Academy of Sciences Ukrainian SSR. They have developed an automatic machine for mass sorting of the ferrite cores for memory devices.

It takes only a second to check the core. During this time, the machine passes through the core a series of pulses, and a logic device in the instrument determines, according to the measurement results, to which of eight standard grades the particular ferrite belongs.

## 12. New Scientific Center in Perm

"New Scientific Center"; Baku, Izvestiya VUZ, Neft' i Gas, No 11 Nov 62, p 46

A scientific-research institute for control computers and systems has been established in Perm.

It is already in operation and in several years will become one of the largest scientific institutions in the country. The machines and systems created by the institute will be used in all branches of the national economy. The institute will carry out theoretical and experimental work in engineering cybernetics, will conduct research on production processes aimed at optimization, and will work on control algorithms. Its work will also include scientific research, planning, design, and technological projects aimed at creating control computers and systems for general industrial and specialized applications. Experimental models of the machines will be produced.

The task of the institute include economic research on the effectiveness of specialized machines and systems in various branches of industry, and cooperation with the divisions of mechanization and automation of enterprises and with inventors working in this field.

The conduct of the institute's operations necessitates the establishment of 17 divisions and 16 laboratories, and the institute will employ more than 1,500 persons.

Besides the scientific laboratories and design bureaus, there will be an experimental base for producing and testing the control computers and system models. These complex cybernetic devices will be able to cope with hundreds of parameters and automatically provide for the optimum conduct of technological processes. There will also be a computer center to serve the needs of the institute's laboratories.

13. Great Demand for New Computers

"Cool Response to Innovation," by S. Smolenskiy; Vil'nyus, Sovetskaya Litva, 28 Nov 62, p 2

Under the guidance of Prof L. Kaulakis at the Kaunas Polytechnic Institute, an analog computer was designed to control the performance of electric power networks. This analog computer is the first of its type ever used in USSR and is now successfully employed in controlling power distribution in the Lithuanian Power System. A similar analog computer is being prepared for the Moscow design institute "Giprokommenergo."

Engr D. Kotilevskiy states that the only plant in the nation that manufactures similar, but less advanced, computers is not capable of satisfying the needs of industry or educational institutes. For this reason, the "Soyuzglavenergo" is obliged to reject many orders. It is considered expedient to organize another enterprise for manufacture of analog computers of the Kaunas type. The annual demand for such computers may be as high as 20-30 per year.

14. New Complex Electronic Computer

"In the Belokanennyy House"; Moscow, Komsomol'skaya Pravda, 1 Dec 62, p 1

A most complex electronic device, "Sirius," is now in process of assembly at the Belokanennyy House overlooking the Dnepr River. The expansion of the term "Sirius" reads: A System for the Measuring and Recording of Control Information and Signalizing.

At the test stand, one can see a maze of wiring, mysterious flickering of miniature bulbs, and a number of drafting desks. The engineers Konstantine Belousov (leader of the group), Tat'yana Ragozina, and Viktor Kaustov have developed new logic elements for the "Sirius."

15. Use of Computer Facilities

"Fuller Use of Computer Facilities," by S. Viktorov; Moscow, Ekonomicheskaya Gazeta, 1 Dec 62, p 40

The following significant excerpts are taken from the article:

"The number of computer-mechanized installations (computing centers, factories, plants, and bureaus) had risen to almost 5,000. Computer facilities are distributed among the branches of the national

economy as follows: industry, 60%; transportation and communication, 14%; agriculture, 6%; the system of Gosbank and financial organs, 6%; construction, 4%; trade, 4%; and others, 6%.

"During the Seven-Year Plan, production of calculators and computers increased 350 - 370 percent.

"A very important development in computer engineering is the production of different types which incorporate high-speed electronic and magnetic elements, as well as a series of units with card programming as the principle of control.

"The introduction of new computer facilities makes possible the organization in the current Seven-Year Plan of 6,500 machine-computing stations and bureaus and more than 400 computing centers.

"The full use of computer facilities is a serious national economic problem. Its solution would make it possible:

"1st -- to at least triple the output of computer-mechanized work (by improving the use of existing equipment and transferring the computer-mechanized installations to a two-shift operation);

"2d -- to increase by approximately 50% the efficiency of the computer operators;

"3d -- to appreciably decrease the cost of production;

"4th -- to release capital for the production and acquisition of computer facilities.

"This is why it is necessary to take decisive measures to bring about order in the use of computer facilities."

#### 16. Russian Robots

"Conversation With a Machine"; Tashkent, Pravda Vostoka,  
16 Nov 62, p 4

Scientists in Moscow, Kiev, and Tbilisi are working on the problem of a "closer" relation between men and machines. In the Moscow Institute of Automation and Telemechanics, "an idea of young mathematician E. Braverman, based on a unique visual course of instruction for a machine, has become a reality."



Georgian scientists have built a truck "which can be controlled by ordinary commands: forward, left, backward, faster, etc. It is interesting that the sensing unit of the machine, tuned to a certain voice, will not respond to a voice with a different timbre."

"It is true at present that the number of commands which the machine will distinguish is limited. But the scientists are on the right track. Research on a system of control of a machine through spoken commands has produced a major revolution in automation."

#### 17. New Small Electronic Computer

"Promin' Electronic Machine," by S. Tsikora (RATAU correspondent); Kiev, Pravda Ukrainy, 23 Nov 62, p 3

The digital computer Promin', recommended for series production, occupies a special position in the family of electronic machines. It solves problems which are economically unsuited for large electronic computers and impossible or too long for desk calculators. Promin' requires only 5-10 minutes to find the solution of complicated systems of differential and linear algebraic equations which are encountered daily in radio engineering, mechanics, and other fields of science.

Promin' is fully equipped with semiconductor elements and, being characterized by high reliability, is simple in operation. One specialist can operate it. The programs and data are fed in by means of a deck of punched cards. Promin' operates on a city power supply and does not use any more power than a television set.

"Our engineers long ago dreamed of such a machine," says the president of the State Reception Commission, Academician A. A. Dorodnitsyn. "The basic value of Promin', as I see it, is in solving problems encountered in everyday work by project engineers, structural engineers, and scientists. That is why the new electronic computer will be of invaluable help to them."

"The great service rendered by the builders of Promin' -- the scientific associates of the Institute of Cybernetics of the Academy of Sciences Ukrainian SSR, supervised by Academician of the Academy of Sciences Ukrainian SSR V. M. Glushkov -- is that the development and installation of the machine were accomplished in an unprecedentedly short time, less than a year."

18. Secondary School Students in Riga Studying Electronic Computers

Moscow, Uchitel'skaya Gazeta, 1 Dec 62, p 3

The caption of a photograph of an identified computer contains information to the effect that, recently, seniors of the secondary schools in Riga began a 3-year industrial course in electronic computers at the Latvian State University imeni P. Stuchka computing center. They are studying the fundamentals of mathematical programming and the operation of computers. They will finish the course as laboratory technician programmers.

19. What Computers Are Doing

"Electronic Mathematicians," A. Tibanova; Moscow, Trud, 24 Oct 62, p 4

The article concerns the work done at the computing center of Moscow State University by its two computers, "Strela" and "Setun'." "Strela" is presently engaged in problems in electrodynamics in the field of geology. Analyzing experimental data on electrical and magnetic fields of the earth, it is determining more suitable methods of drilling into the earth for minerals.

"Setun'," in an adjoining room, is working on a variety of projects. Although considerably smaller than the large computers, it is still a very versatile machine, doing such things as calculating flights of interplanetary vehicles, determining more efficient operations in the sugar and textile industries, and analyzing crystals of minerals such as rubies and emeralds. According to the author, this latter work is being done at many computing centers throughout the country.

A distinct advantage of "Setun'" is that it requires only 2 minutes to ready it for operation, as compared with several days for the large computers. This computer is widely used in higher educational institutions and scientific-research institutes.

20. New "Minsk-1" Electronic Computer

Moscow, Ekonomicheskaya Gazeta, 10 Nov 62, p 28

A picture of a "Minsk-1" electronic computer is shown, with the following caption:

"The Novosibirsk Electrical Engineering Institute has acquired a "Minsk-1" electronic computer. It has been installed in the building of the recently organized Chair of Mathematical Computing Instruments

and Equipment. In 1963, the institute will turn out the first group of young specialists in computer engineering. The presence of the machine will enable the students to better master their future specialty. It will serve the VUZ computing center and the industry of the Novosibirsk Council of National Economy. In the picture: Engr Dong Ding Kim (at left) and laboratory technician Vladimir Rakov make adjustments on the "Minsk-1" machine in the computing center of the institute."

## 21. Computers for Regulating Temperatures

"Birth of an Electronic Brain," by N. Teterin; Moscow, Vechernyaya Moskva, 26 Oct 62, p 2

A new line of electronic computers, the "Amur" -- successor to the "Mars," is now in existence. The first experimental model, nicknamed "Martian" by those who built it, was turned out by the Energopribor factory. The new computer is superior to the "Mars" in several respects: semiconductor elements have replaced mechanical contacts, it is smaller, and its construction is simpler.

These machines are designed specifically for use in regulating temperatures in the refrigeration industry, and, according to the author, just one of them will save the government thousands of rubles.

## 22. Optimal Parameters of Digital Computing Equipment With Given Accuracy

"Selection of Optimal Parameters of Digital Computing Equipment With a Given Accuracy," by V. A. Brik; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Energetika i Avtomatika, No 5, Sep/Oct 62, pp 123-130

In the design of different specialized digital computing mechanisms, after the mathematical method of solving the given problem has been decided upon, the problem arises as to the optimal parameters of the equipment which guarantee an extremum of some criterion of optimality. A successful solution of this problem makes it possible to reduce costs and complexity, increase reliability and speed of operation, and make the operation of the digital equipment easier.

The author first derives an algorithm for the operation of the equipment and then considers the problem of selecting its optimal parameters. He sums up his findings as follows:

"In the example of a digital computing mechanism, solutions to the problem of defining its optimal parameters are indicated for a given algorithm. The optimal parameters guarantee an extremum of the selected criterion of optimality.

"In the solution of the indicated problem, the optimality of the digital mechanism can be evaluated by various criteria of optimality appearing as functions of the desired parameters and taking into account those features of the equipment which, in a given case, result in the greatest value.

"In the selection of optimal parameters, it is necessary to take into account the limitations placed on the parameters and the characteristics of the computing mechanism. One of the most important is the tolerance of error in the computation.

"It should be noted that the actual method of selecting optimal parameters, i.e., the method of solution of the problem and formulation in general form, given in the first part of the article can be modified for each particular case, since it depends on the computing mechanism being considered, its algorithm defining the requirements, and the accepted criterion of optimality."

## 23. Cybernetics: Address Language

"Completeness of Address Language Procedures" (presented by Academician V. M. Glushkov, Academy of Sciences Ukrainian SSR), by K. L. Yushchenko, Institute of Cybernetics, Academy of Sciences Ukrainian SSR; Kiev, Doklady Akademii Nauk Ukrainiskoy SSR, No 10, 1962, pp 1305-1307

It is shown in the article that "address language" information concerning not only actual conditions of the problem, but also the type of problem itself can be related to the initial information. The algorithm can be written in general form, independently of the problem solved. The address language allows transference of an arbitrary amount of initial information to the address storage.

## 24. Analysis of Linear Systems by Use of Noise Functions

"Analysis of Linear Systems by the Method of Noise Functions," by G. P. Molotkov; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Energetika i Avtomatika, No 5, Sep/Oct 62, pp 59-65

A method is described for the study of uniform and nonuniform linear systems with uniform random signals by functions called "weighted noise functions" of the system. Introduction of noise functions makes possible the shortening of the amount of computation in the case in which several incoming signals are acting on the system. The possibility of using the two-sided transformation of Laplace for regular outgoing signals is indicated. An example is given of the use of the method of noise functions for determining an optimal value of a time constant in a servo system which guarantees the least sum of mean square and dynamic errors.

27. Uniqueness of Optimal Control in Discrete Systems

"The Question of Uniqueness of Optimal Control in Discrete Systems," by R. Gabasov; Moscow, Izvestiya Akademii Nauk SSR, Otdeleniye Tekhnicheskikh Nauk: Energetika i Avtomatika, No 5, Sep/Oct 62, pp 99-106

The article concerns the behavior of a control system as expressed by the difference equation  $x(n+1) = Ax(n) + bu(n)$ ,  $x(n) = \{x_1(n), x_2(n), \dots, x_\ell(n)\}$ ,  $b = \{b_1, b_2, \dots, b_\ell\}$ ; where  $x(n)$  is an imaginary vector in phase space,  $A$  is a constant nonspecial matrix,  $b$  is some vector, and  $u(n)$  is a scalar function of a discrete argument  $n$ .

The problem of optimal control for a high-speed condition may be stated as follows: Given an initial point  $x(0) = \{x_1(0), \dots, x_\ell(0)\}$ , it is required to find the group of control variables  $u(n)$  ( $n = 0, 1, 2, \dots, K-1$ ), such that the trajectory of the system "arrives" at the beginning of the coordinates in the least possible number of steps  $K$ . Then the value of  $u(n)$  is obtained, subject to the condition  $|u(n)| \leq 1$ ,  $n = 0, 1, 2, \dots, K-1$ .

28. Optimization For Arbitrary Control Action Dispersion

"Synthesis of One Class of Optimum Systems," by V. N. Zhigulev, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, Nov 62, pp 1431-1438

The problem of synthesizing an optimum system is considered from the point of view of minimum mean square error at a given moment of time for the case where the limitation of the dispersion of the control action occurs at an arbitrary moment of time. Since this evolves into a typical problem for a conditional extremum, the solution of which involves two stages (solution for absolute extremum for the Lagrange functional and finding the unknown Lagrange function by the compliance of the obtained solution with an additional condition) and since the solution of the problem by the classical method is difficult, methods of the dual-equation theory are used here.

25. Approximation Method for Automatic Control Systems With Variable Parameters

"An Approximation Method for the Study of Automatic Control Systems With Variable Parameters," by V. M. Ponomarev; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Energetika i Avtomatika, No 5, Sep/Oct 62, pp 77-81

Analysis of automatic control systems with variable parameters is made very difficult since, in the general case, it is not possible to put in analytic form the general solution of differential equations with variable parameters expressing the dynamics of the system. Solodov indicated that in the study of systems with variable parameters it is advisable to use a pulse transfer function of the system ("Elements of the Theory of Linear Systems With Variable Parameters," Tr. AIA imeni Dzerzhinskiy, 1958). However, even an approximation by means of well-known methods of pulse transfer functions for high-order systems frequently has a large amount of computation connected with it.

This article presents a method for approximating the solution of differential equations with variable coefficients in which it is possible to find fairly easily an analytic expression for a pulse transfer function of the system.

26. Optimal Dynamic Control Systems Expressed by Finite Equations

"Finite Equations Characterizing an Optimal Dynamic System," by A. N. Sklyarevich; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Energetika i Avtomatika, No 5, Sep/Oct 62, pp 82-88

The most serious problem in the theory of automatic control is that of synthesizing an optimal dynamic system. At the present time, its solution is commonly based on the criterion of a minimum mean square error. In spite of the relative simplicity of the general solution of the problem with such a criterion, the search for a transfer function of an optimal system involves complicated transformations connected either with integration in the complex region or with the solution of integral equations.

The author presents a different method of defining a dynamic system which guarantees a minimum mean square error. This method is based on the use of an optimal transfer function in the form of the sum of an integral part and simple fractions and on the search for all parameters involved by means of the solution of algebraic equations.

29. Discrete Automatic Optimizer Tested

"A Discrete Automatic Optimizer. II.," by Ts. Ts. Paulauskas, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, Nov 62, pp 1497-1506

A description is given of a control installation consisting of two sections, a controller using a program-controlled matrix distributor and a discrete automatic optimizer which operates on the basis of an algorithm described in the first part of this work (Avtomatika i Telemekhanika, Vol 23, No 5, 1962). Some results are also given of an experimental operation of a model of the automatic optimizer, which can perform up to 185 operations per second. The model contains 420 P15-P16 triodes, 20 P-11 triodes, and 900 D9V, D9D diodes. The resistors are all type MLT-0.5, and the capacitors, type KTK.

The project was assigned by A. A. Fel'dbaum, and the assembly and operation of the model of the optimizer were done with the aid of A. V. Kalinina, T. A. Stepakova, V. S. Nekrasov, V. P. Golyshev, I. N. Bocharov, and V. A. Zlochevskiy.

30. Analytical Design of Controllers

"Analytical Design of Controllers. V. Further Development of the Problem," by A. M. Letov, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, Nov 62, pp 1405-1413

It is shown that the nonclassical variation of the problem formulated here can be simplified by employing the general idea of F. A. Valentyn (source not cited). The basic equations are derived by the Bellman (source not cited) method of dynamic programming. The formal solution obtained here suggests further study of convergence, satisfaction of Sylvester criterion, sign determinability, and positiveness of functions, preferably with the use of analog computers.

31. Transfer Functions and Stability of Systems With Linearly Variable Parameters

"Transfer Functions of Automatic Control Systems With Linearly Variable Parameters," by V. K. Semenikhin, Leningrad; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, Nov 62, pp 1421-1430

Those systems are considered in which certain coefficients representing known time functions change linearly with time, while other such coefficients are represented by polynomials of finite order. In such a case, the transfer



function satisfies a linear differential equation of the first order, which can always be integrated in quadratures, the treatment of which is frequently less difficult than a direct solution of the original differential equation.

It is shown that, for the automatic control systems with linearly variable coefficients, stability is contingent upon a limited interval of time of observation.

The transfer functions arrived at here cannot, in the general case, be expressed by elementary functions, which reduces the possibility of practical application of the obtained results for solving concrete problems. However, if the reaction of the system is considered for only one or several observation times, the obtained transfer functions can be used more practically than an approximate solution of the original differential equation. Furthermore, the study of the behavior of the transfer functions with respect to a complex variable for all time values affords the possibility of determining the stability of systems with variable parameters.

### 32. Sequence-Variation Algorithm for Relay Switching Regimes

"Changing the Sequence of Sequential Machines and the Synthesis of Relay Circuits," by M. A. Ayzerman, L. A. Gusev, L. I. Rozonoer, I. M. Smirnova, and A. A. Tal; Moscow; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, Nov 62, pp 1465-1491

An algorithm is devised on the basis of the minimum number of states of a sequential machine which operates at a given rate (fast) and reproduces a given sequential machine which operates at a rate slow determined by discrete steps in the variation of the input condition. It is shown that this algorithm can be used to reproduce various machines of the sequential type and is thus suitable for the synthesis of relay circuits.

### 33. Optimum Redundancy Where Reliability of Redundant Operation Is Not Absolute

"Determining the Optimal Redundancy of a System With Impairment of Sections During Redundant Operation Taken Into Account," by A. L. Raykin, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, 1962, pp 1536, 1541

Drawing heavily on cited English-language sources (particularly Black and Proshan, Operations Research, No 5, 1959; Geisler and Karr, Operations Research, No 4, 1956; and Kuhn and Tucker, Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability, pp 481-492, Berkeley,

1951), this work considers the problem of determining (from the point of view of reliability) the optimum number of redundant sections of various types, where total-weight, volume, and cost restrictions are enforced.

#### 34. Parameter Adjustment Limits in Discrete PI-Controllers

"Some Bloc, Diagrams and Dynamic Characteristics of Digital Controllers," by S. N. Diligenskiy, Institute of Automation and Telemechanics, Moscow; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, 1962, pp 1451-1464

Some block diagrams are given of experimental models of digital PI-controllers built on the basis of research work done at the Institute of Avtomation and Telemechanics in Moscow. This discussion covers the dynamic characteristics of these models and the limit of parameter variation during adjustments when the characteristic of the actuating motor is nonlinear.

It is found that a proportional-integral law of control can be arrived at with a certain degree of accuracy in discrete form on the basis of a unitary code. This form of control law affords the possibility of designing controllers on the basis of digital engineering units. The designs presented here can be used with either variable-speed or constant-speed motor.

In the ideal discrete PI-controller, only the upper limit of the frequency characterist  $\Omega_{max}$  is limited, whereas in the discrete PI-controller there are the additional upper and lower limits for the entire range of the output signal amplitude.

The range of variation of the parameters during adjustment is practically unlimited; the method used to vary the proportionality and integrating time constant determines the limits imposed on changes of frequency and output signal amplitude.

Ye. K. Krug was consulted in this work.

35. Self-Oscillations in Piecewise-Linear Continuously Automated Systems

"On the Accurate Determination of the Self-Oscillations of Piecewise Linear Continuous Systems," by Ye. N. Rozenvasser, Leningrad; Moscow, Avtomatika i Telemekhanika, Vol 23, No 11, 1962, pp 1414-1420

It is shown that, in the determination of the self-oscillations of piecewise linear continuous systems by the step-by-step method, the case necessarily arises where the determinant for the initial conditions of the linear system which corresponds to the self-oscillation is equal to zero. In such a case, certain additional correlations exist which afford a considerable simplification of the transcendental equations of the periods.

F. R. Gantmakher was consulted in the work.

36. Subprogram Checks Accuracy of Information Transmission and Reprocessing of Addresses

"Standardized Subprogram for Checking the Transmission of Information and the Reprocessing of Internal Addresses (60 SP)," by Ye. A. Zhogolev, Sistema Avtomatizatsii Programmirovaniya (A System of Automating Programming -- a collection of articles), Moscow, 1961, pp 52-68 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-1-17 Zh)

A program devised for group transmissions of information incorporates also a check on the accuracy of the transmissions and provides a change of internal addresses with introduction of information into the operative memory. A check addition is used to check the accuracy of the transmissions. A brief description is given of the steps involved in the program and of the completed program for checking the group transmissions and for reprocessing the internal addresses. A logic circuit is introduced for the subprogram in operator form, and the program with necessary constants is described. The program is distributed in three sections of the memory of the standardized subprograms of the Strela machine and occupies about 30 cells.

37. Standardized Subprogram for Checking Computations

"A Standardized Subprogram for Checking Computations," by Ye. A. Zhogolev, Sistema Avtomatizatsii Programmirovaniya (A System of Automating Programming -- a collection of articles), Moscow, 1961, pp 181-187 (from Referativnyy Zhurnal-- Avtomatika i Radioelektronika, No 9, 1962, 9-1-17 Kh)

The subprogram provides a check on the process of computation by successive steps. After each step check has been made, a sum value of the entire checked body of the memory is obtained; and after a second checking procedure has been carried out, the checked sums are compared. If the checked sums do not agree, a third check is made. If no agreement is forthcoming with the third check, the operation is discontinued. The checking program is automatically subjoined to the checked program with the first instruction. The checking process is determined by the time of one check (3-5 minutes on the Strela computer). The entire process of computations is divided into stages by means of so-called "shift-to-check" commands. The checking process and the commands for the delivery of results and for shut-down are given in the check table, which subjoins the subprogram to the to-be-checked program and introduces the subprogram check at the beginning of operations. The logic circuit of the subprogram is given. The memory, including the checking subprogram, comprises 0070 plus 3n cells, where n is the number of shift-to-check commands.

38. Analyzing Subprogram Provides Inverse Solution of Compiled Program

"An Analyzing Program," by Yang Fu-Tz'un, Sistema Avtomatizatsii Programmirovaniya (A System of Automating Programming -- a collection of articles), Moscow, 1961, pp 168-181 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-1-18 a)

The analyzing program solves the inverse problem of the programming program, i.e., it retraces the logic circuit of the analyzed program and the initial information on arithmetical operators fed to this logic circuit. The analyzing program affords the possibility of determining the accuracy of the organization of the analyzed program and can also be used to examine an already completed program. The analyzing program consists of two parts: the first part breaks down the examined program into operators of various types, and the second part restores the original information on the arithmetical operators, that is, restores the concrete formulas containing each of these operators. An algorithm for restoring the logic circuit is given.

The obtained logic circuit was in satisfactory agreement with the original.

The switch-over to the analyzing program was done by means of a standardized subprogram.

39. Auxiliary Storage Unit For Nonstandardized Operators

"Auxiliary Storage Units and a Storage Unit for Processing Nonstandardized Operators," by L. S. Nefed'yeva, Sistema Avtomatizatsii Programirovaniya (A System of Automating Programming -- a collection of articles), Moscow, 1961, pp 84-88 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-1-18 1)

A description is given of an auxiliary input unit for a programming program used to compile a brief logical arrangement of the program on the basis of the initial information and a storage unit for nonstandardized operators. Two types of nonstandardized operators are distinguished. Operators of the first type represent different parts of the program stored in random addresses and having standardized structure. Operators of the second type are always derived from a logic circuit and have a number. Nonstandardized operators of the second type consist of single commands (input, output, switch control, etc.); they are not derived from a logic circuit and are described by a single command. When the storage unit for nonstandardized operators completes its operation, all the nonstandardized operators are incorporated into the semiprogram in the order of their sequence in the logical arrangement, and all the absolute constants of these operators are incorporated in the general body of constants.

40. Cybernetics in Engineering Problems

"On the Use of Cybernetic Techniques in the Synthesis of Mechanisms," by D. M. Berkovich; Doklady L'vovskogo Politekhnikeskogo Instituta (Reports of L'vov Polytechnic Institute), 1961, No 1, Mekhanika (Mechanics), pp 80-83 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-1 s)

The fact that the most accurate solutions of problems involving the synthesis of mechanisms can be obtained by the use of cybernetic techniques is demonstrated by an enumeration of all the steps in the total synthesis of a mechanism, nearly all of which require considerable mental effort. The cybernetic approach is aimed at finding the optimum variations of the kinematic arrangements through an examination of the greatest possible number of arrangements which combine the elements which make up the mechanism. Two variations of the synthesis are possible: (1) the role of the machine is reduced to a rapid and precise analysis of the many variations suggested by the human, the analysis remaining up to the human; and (2) all the operations of the analysis and of the synthesis of the mechanisms are carried out by a machine, as well as the formulation of the basic quantitative and qualitative indexes of the mechanisms.

Since, in the use of cybernetic machines, the prevailing method of reproducing structural groups of mechanisms is unreliable, it is suggested that structural groups be considered as they are in the case of a kinematic analysis or analysis of forces of mechanisms.

41. Core Size in Magnetic Logic Element Under Mixed Loads

"On the Operation of a Magnetic Logic Element on an Active-Inductive Load," by V. S. Podlipenskiy, Izvestiya Kiyevskogo Politekhnikeskogo Instituta. Sbornik Trudov Aspirantov Elektrotekhnicheskogo Fakulteta (News of the Kiev Polytechnic Institute. Collection of the Works of Aspirants of the Electrical Engineering Faculty), No 1, 1961, pp 60-77 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-18 t)

An examination is made of the operation of a magnetic logic element based on a half-wave circuit under an active-inductive load, and an analysis is made of its operation in both coincidence and anticoincidence regimes, for which the equations are derived. Unlike the case of an active load, when the load is complex, the current in the control

circuit can, during the demagnetization of the core, greatly exceed the coercive current. It was found that, in the case of the complex load (active-inductive), as well as with an active load, the amount of steel in the core was directly dependent on the average load intensity and indirectly dependent on the values of the saturation induction ( $H_c$ ), the supplied frequency, and the efficiency factor. Furthermore, the amount of steel in the core was found to be directly dependent on the modulus of the total impedance of the active circuit and inversely dependent on the amplitude of the active voltage.

#### 42. Temperature Stabilization in Magnetic Amplifiers

"A Method of Stabilizing the Temperature of Magnetic Amplifiers," by N. M. Tishchenko, Trudy Moskovskogo Aviatsionnogo Instituta (Proceedings of the Moscow Aviation Institute), No 139, 1961, pp 142-151 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-28 1)

A procedure is considered for stabilizing the temperature of a magnetic amplifier by introducing temperature-compensating members into the mixer circuit or into the feedback circuit. In the first case, the shift of the characteristics of the amplifier is guaranteed; and in the second case, the steepness of the characteristics is changed. Graphic methods are given for computing the stabilization of the mixer and the amplification factor.

#### 43. Advantages of Thyatron Relay Over Electromechanical Type

"Thyatron Timing Relay for Relay Protection and Systems Automation," by P. S. Rolemblovskiy and Yu. Ya. Mezhenyy, Sbornik Nauchnykh Trudov. Institut Avtomatiki Gosplana USSR (Collection of Scientific Works. The Institute of Automation, GOSPLAN, Ukrainian SSR), No 2, 1961, pp 139-146 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-35 m)

A description is given of a model of a timing relay with low input requirements, good temperature stability, no mechanically moving parts, and other advantages over ordinary electromechanical timing relays. This relay also has the advantage of being able to recover rapidly in the event of a control-signal cutoff before the relay is operated.

The description includes timing relay circuits for both DC and AC with the following general characteristics: 220 volts for the DC relay, 100-127-220 volts for the AC relay; a time lag of 0.25-4.0 seconds (plus-minus).1 second spread); admissible temperature gradient of ambient medium of minus 35 to plus 35 degrees centigrade; lower power requirements than electromechanical relay; requires no clock mechanism; provides great number of switching operations (0.5-1.0 min); provides increased substitution of resistances and capacitances of the RC circuit; and can be designed for ranges of 0.0-4.0 seconds, 0.0-10.0 seconds, or 0.0-20.0 seconds for use in relay protection.

#### 44. AC Induction Motors for Actuating Automated Equipment

"The Two-Phase Induction Motor As an Actuator for Low-Power Automation Systems," by T. N. Pavlenko, Trudy Instituta Energetiki AN LatvSSR (Proceedings of the Institute of Power Engineering, Academy of Sciences Latvian SSR), No 12, 1961, pp 209-224 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-43 N)

A comparative analysis is made of two classes of motors (with hollow and shorted rotor) on the basis of their characteristics, as well as an analysis of the control circuits. The analyses are based on experimental data.

It was found that two-phase induction motors with hollow rotor are not the only type suitable as actuators in automatic systems since, with appropriate choice of parameters, it is possible to design and induction motor with shorted rotor which, on the basis of dynamic characteristics (time constant), is on a par with a DC motor.

Distortion of the motor characteristics can be avoided by introducing an additional resistance into the rotor circuit through a magnetic amplifier (with a bridge circuit).

By proper choice of rated parameters for the motor, it is possible to eliminate the unfavorable influence of the control circuit and to produce an AC system which is just as suitable for use as automatic systems with DC motors.



45. Simplification of Hydraulic Systems in Automated Equipment

"The Problem of Simplifying Complex Circuits of Hydraulic Drives and Hydraulic Automatic Equipment," by A. V. Pere-krestov, Sbornik Nauchnykh Trudov. Dnepropetrovskiy Inzhenernyy Stroitel'nyy Institut (Collection of Scientific Works. The Dnepropetrovsk Engineering Construction Institute), No 18, 1961, pp 67-77 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-44 y)

On the basis of the laws of mathematical logic, an analysis is made of complex hydraulic system; and for the structural layout of a hydraulic system, a description is given in the form of a logical algebraic formula, which is then simplified with the aid of the laws of mathematical logic. Equivalent formulas of algebraic logic are also used in the purpose of simplifying the various sections of the complex hydraulic system.

It is shown that the use of these equivalent formulas considerably facilitates the transformation and simplifies the complex hydraulic systems of modern hydraulic drives and automatic hydraulic systems and even simplifies the principal circuitry of pneumatic drives.

46. Industrial Meters Based on Radioactive Radiation

"The Use of Nuclear Radiations in the Automatic Control of Production," by N. N. Shumilovskiy and L. V. Mel'ttser; Riga, Radioaktivnyye Metody Kontrolya i Regulirovaniya Proizvodstva (Radioactive Methods of Control and the Regulation of Production), 1959, pp 3-22 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-67 T)

Expressions are given for increasing the accuracy of radioactive measurements through the establishment of the relative measurement error and dynamic precision. The improvement of accuracy is shown to be possible through the use of a modulated radioactive radiation; the use of relay circuits operated according to frequency, phase, or time; and the use of periodic automatic calibration of instruments at input.

The basic accomplishments of the USSR in various areas of radioactive instrument design are discussed. In the area of the measurement of the density, weight, and thickness of materials, successful results have been obtained in the designing of instruments to measure the density of powders, the first instrument being produced by the State Inspectorate

for Surveillance of Safety Precautions in Industry and for Mine Safety (GOSGORTEKHNAZOR) and the most advanced design by the Physics Institute, Academy of Sciences USSR. The PZhR-1 and PZhR-2 density meters of the Scientific-Research Institute of Technology of Machine-Building (NIITM) and the density meter based on a radioactive relay designed by the Institute of Physics, Academy of Sciences Latvian SSR, are mentioned.

A block diagram is given for the "Gosznak" weight-meter for automatic monitoring of the weight of paper according to the absorption in it of the beta emission from thallium-204. Other instruments designed by other institutes are treated more briefly.

#### 47. Synthesis of Sequential Automata

"On the Synthesis of Sequential Automata," by A. D. Zakrevskiy, Trudy Sibirskogo Fiziko-tekhnicheskogo Instituta pri Tomskom Universitete (Proceedings of the Siberian Physico-technical Institute at Tomsk University), No 40, 1961, pp 89-94 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-154 u)

The fundamental step in the synthesis of a relay circuit is the transition from the pair of many-valued logic functions

$$Y = F_1(X, Z')$$

$$Z = F_2(X, Z')$$

to the structure of a circuit which realizes given ratios between variables. Each of the variables  $X$ ,  $Y$ , and  $Z$  can, correspondingly, assume the numerical values  $N$ ,  $M$ , and  $S$ . The problem lies in finding the minimum value of the parameter  $S$  in order to simplify the structure of the synthesized circuit. The solution of this problem requires finding that pair of functions,  $F_1$  and  $F_2$ , which would correspond to the minimum number of different values of the variable  $Z$ .

A survey is given of the methods of reducing the number of states of the circuit and the number of possible criteria of optimal selection.

48. Synthesis of Multiposition Circuits

"Minimization of the Structural Formulas of Multiposition Circuits," by A. D. Zakrevskiy, Trudy Sibirskogo Fiziko-tehnicheskogo Instituta pri Tomskom Universitete (Proceeding of the Siberian Physicotechnic Institute at Tomsk University), No 40, 1961, pp 95-99 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-156 a)

A method is given for finding the optimum variants of a supplementary definition of the operator of a multiposition (multitime) circuit given in switching tables. The method is related to the conversion of indeterminacy of the initial operating conditions of a multiposition (multiposition (multitime) circuit into Boolean functions and represents a reduction of the problem to the problem of minimizing incompletely defined or determined Boolean functions. While similar to the method described in V. N. Roginskiy's book (Elementy Strukturnogo Sinteza Releynykh Skhem Upravleniya (Fundamentals of the Structural Synthesis of Relay Control Circuits), Moscow, Academy of Sciences USSR, 1959, the method described here differs in that the initial operator of the circuit and of the Boolean functions is represented in matrix form, which facilitates the search for the optimum variants of the supplementary determination.

49. Automatic Control System for Steamship Propulsion

"The Complex System of Automatic Control for the Power Plant of the Steamship Kolkhoznik," by L. P. Ivanov, Informatsionnyy Sbornik. Tsentral'nyy Nauchno-issledovatel'skiy Institut Morskogo Flota (Information Bulletin. The Central Scientific-Research Institute of the Maritime Fleet), No 64, 1961, pp 32-43 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-184 a)

In 1959, the Central Scientific-Research Institute of the Maritime Fleet (Leningrad) designed for the SS Kolkhoznik a complex automatic control system consisting of the following sections: (1) the KQM-2 full-range burner control; (2) the power supply for the automatic control system; (3) the automatic control installation for the boilers; and (4) the remote temperature control for the most critical subassemblies of the power installation.

The existing equipment of the vessel was worked into the new design.

50. Soviet 1961-1965 Plans for Automation in Petroleum and Gas Extraction

"The Introduction and Basic Trends of Scientific-Research Experimental-Design and Planning Activities in the Area of Complex Automation of the Extraction of Petroleum and Gas for the Period 1961-1965 in the USSR," by A. V. Sinel'nikov, Kompleksnaya Avtomatizatsiya v Dobyche Nefti i Gaza (Complex Automation in the Extraction of Petroleum and Gas -- a collection of articles), Moscow, 1961, pp 5-17 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-196 k)

Emphasis is on the transition from the automation of single wells to the complex automation of entire oil fields, including even the auxiliary facilities of the petroleum- and gas-producing enterprises.

Data are compiled by sovnarkhozes on the automation of petroleum and gas extraction and on the industrial production of automation equipment.

The discussion likewise stresses the insufficient scope of work being done on the automation of gas-producing facilities and the unreliability of the apparatus.

Among the most pressing problems is that of providing complex automatic control of the working of an oil deposit; the associated problems are enumerated.

51. Dimensionless Criteria in Analog Simulation of Amplifiers

"Theoretical Basis for the Mathematical Modeling of Magnetic Amplifiers and Saturation Coils," by E. A. Yakubaytis, Trudy Instituta Elektroniki i Vychislitel'noy Tekhniki, AN LatvSSR (Proceedings of the Institute of Electronics and Computer Engineering, Academy of Sciences Latvian SSR), No 1, 1971, pp 5-27 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-28 v)

An analysis of the relationships characterizing the processes in magnetic amplifiers and saturation coils indicates that the introduction of reference units and dimensionless criteria affords the possibility of:

1. modeling amplifiers and coils with conductors of different materials and forms, without changing the relationship  $\mu * = \varphi (H*)$  established in the nonlinear sections of the analog computer;

2. studying the characteristics of amplifiers and coils operating at different frequencies, without using the frequency in the analog computer; and

3. reducing the number of variable coefficients in the sections of the analog computer.

## 52. Relay-Circuit Synthesis by Indeterminate Operators

"On the Synthesis of Relay Circuits According to Incompletely Defined Operators," by A. D. Zakrevskiy, Trudy Sibirskogo Fiziko-tekhnicheskogo Instituta Pri Tomskom Universitete (Proceedings of the Siberian Physico-technical Institute at Tomsk University), No 40, 1961, pp 100-111 (from Referativnyy Zhurnal -- Avtomatika i Radioelektronika, No 9, 1962, 9-2-152 Y)

In the problem of a logic circuit in which an incompletely defined Boolean function serves as operator, the operator of the logic circuit is considered to be completely defined if for each combination of values of input variables it uniquely determines the corresponding combination of values of output variables. In the opposite case, it is called an incompletely defined operator, the indeterminacy of which can be estimated quantitatively, if the number of possible determinations is represented by a dyadic logarithm. Considering an incompletely determined Boolean function is equivalent to considering a set of completely determined Boolean functions, that is, that combination of input functions which corresponds to either a unit or Boolean value of output variables.

## Power Engineering

### 53. New Huge Soviet Turbogenerators

"Power Generating Giants"; Moscow, Izvestiya, 27 Nov 62, p 3

The State Committee has just confirmed the acceptance of a new 300,000-kw generator from the Khar'kov Plant for Heavy Electrical Machine-Building. This new generator, designated as TGV-300, is

almost identical in over-all size and weight to the previous 200,000-kw model. The efficiency of this new generator exceeds that of the best generators of similar type manufactured in the US. Successful completion of tests of the TGV-300 generator has paved the road for switching the plant conveyor line to production of this new unit. This prototype unit will soon be shipped to the Pridneprovskaya State Regional Electric Power Plant, largest in Europe. A special test stand weighing several thousand tons was built at the plant to test the new 300,000-kw units. More than 300 engineers are employed at the design department of the plant.

The stator and rotor of this new generator are cooled by hydrogen gas at elevated pressure. The rotor winding of the TGV-300 unit is assembled with hollow insulated tubes which serve simultaneously as electric conductors and hydrogen gas conduits. About 400 of the nation's enterprises participated in the building of this new generator. The Nikopol' Yuzhnotrubby Plant has rolled about 12 kilometers of special tubing for this project.

The schematic design of a 750,000-kw steam turbine has been completed at the S. M. Kirov Plant in Khar'kov. Practical realization of a 1,000,000-kw turbogenerator now rests primarily on the ability of metallurgists to develop super alloys able to withstand the enormous stress.

#### 54. High-Altitude Power Engineering Laboratory

"To Clouds To Obtain Electricity"; Moscow, Izvestiya, 29 Nov 62,  
p 4

A Scientific Centre for Study of High-Altitude Power Engineering was established at an altitude of 3,500 m above sea level, near one of the mountain passes of the Kirgiz ridge (Kirgizskiy Khrebet). Here the new laboratories of the Academy of Sciences Kirgiz SSR for high-altitude transmission lines will start functioning soon.

The establishment of this high-altitude scientific base was necessitated by the decision to build the world's largest high-altitude cascade of hydroelectric power plants on the Naryn River. It will consist eventually of 22 power plants with a total capacity of 7 million kw.

The new laboratories of the academy will work on problems of the most economical construction of high-altitude power lines and their efficient insulation under such conditions. Investigation will be conducted of ground conductivity under conditions of permafrost.

55. Huge Hydraulic Turbine in Production Stage

"Largest Turbine in the World"; Moscow, Pravda, 21 Dec 62, p 2

The Leningrad Metals Plant has begun manufacture of the 500,000-kw hydraulic turbine for the new Krasnoyarskaya Hydroelectric Power Plant. This turbine will be the largest ever built.

The turbine will weigh 1,200 tons, and the diameter of the water wheel will be 7.5 meters. To reduce the over-all weight, the turbine was designed to operate at speeds considerably higher than conventional speeds. Its main thrust bearing will be located in the roof, thus permitting a reduction of the over-all height of the turbine.

The chill molds for the 9-ton propeller blade castings are now being made at the plant foundry. It is the first time that the plant is attempting such huge castings in chill molds.

56. Design of the Last Stage of Volga Cascade

"Last Stage of the Cascade"; Moscow, Izvestiya, 15 Dec 62,  
p 6

The Affiliate of the Gidroyekt Institute imeni S. Ya. Zhuk has begun the survey and design for the Nizhne-Volzhsкая (Lower-Volga) hydroelectric plant, which will be located near the town of Yenotayevsk, Astrakhanskaya Oblast. The plant will have 20 hydrogenerators.

Since the new dam will raise the water level in the Volga River about 15 meters, a huge, 360-kilometer earthen dam extending from the Volzhskaya Hydroelectric Power Plant to the city of Astrakhan' will have to be built to prevent inundation of the fertile Volga-Akhtubinskaya valley.

57. Moscow Hydraulic Engineering Laboratory

"Moskva"; Moscow, Ekonomichskaya Gazeta, 8 Dec 62, p 29

Caption under a photograph of the interior of the Laboratory for Hydraulic-Engineering Investigations of the "Gidroyekt" Institute reads as follows:

"All large hydraulic-engineering constructions of our nation undergo tests at the laboratories of the scientific-research sector of the 'Gidroyekt' Institute imeni S. Ya. Zhuk. Here were tested the models of construction components and equipment for the Volga-Don canal, the Canal imeni Moscow, and the Tsimlyanskaya, the Kuybyshevskaya, and many other hydroelectric stations.

"The scientists of the institute also help many other nations in construction of large hydraulic-engineering projects. The photograph shows the Laboratory for Hydraulic-Engineering Investigations. In the foreground of the photograph is a model of the Votkinskaya Hydroelectric Power Plant."

58. Transformerless Step-Down Substation for 110- to 220-kv Power Lines

"Step-Down 100- to 220-kv Substations With Capacitive Voltage Division," by V. D. Yurenkov; Moscow, Elektrichestvo, No 11, Nov 62, pp 26-31

Investigation of the feasibility of capacitive type voltage dividers for stepping-down power line voltage has proved their efficiency and flexibility. This new type of capacitive voltage divider can step down the 110- 220-kv power line voltage to the level of consumer requirements for a power demand not in excess of 2,500 kva. Such step-down substations provide additional reactive power which helps to improve the balance of reactive power in the power system and thus to lower losses in the transmission line.

The design principles of the capacitive step-down substations and the calculation of technical and economic factors are presented. These factors permit selection of optimum parameters and an estimate of the advantages of capacitive substations over the conventional transformer type.

59. Feasibility of Higher Frequencies in Power Lines

"How To Transmit Current"; Moscow, Moškovskaya Pravda, 23 Oct 62, p 2

Prof V. A. Venikov believes that electrification of rural districts can be speeded up by increasing the frequency of current in power lines to a higher value, say to 150 cps, because under those conditions current can be induced in local lines running parallel to the main power lines without resorting to substations or transformers. Dr Venikov questions the existing industrial frequencies of 50 and 60 cps as being optimal for over-all performance of transmission lines and electrical equipment. A commission was organized just prior to the World War II under the direction of academicians V. S. Kulebyakin and G. M. Krzhizhanovskiy to study this problem, but the beginning of the war interrupted its work.



Venikov believes that serious consideration should be given to the problem of transmitting electric power at higher than conventional frequencies.

Miscellaneous

60. Reorganization of Supervision at Scientific and Design Institutions

"To Achieve Unified Engineering Policy Moscow, Pravda, 6 Dec 62,  
p 1

A short introduction reads as follows:

"An all-out speed up of engineering progress is required in the interests of building communism. Up to now, the supervision of most scientific-research and design-construction institutions was decentralized among sovnarkhozes, ministries, and administrations. This was hindered the realization of unified engineering policy in various branches of national economy and hampered the introduction of advanced technology.

"The November Plenum of the Central Committee CPSU has decided to reorganize the supervision of scientific-research and design institutions, to eliminate duplication and isolation of their activities, and to realize measures which will lead to centralization of the supervision of engineering policy."

61. Soviets Are Complaining on Slowness of Introduction of Inventions

"Tremendous Reserves -- the Inventions," by V. A. Ivanov;  
Moscow, Izobretatel' i Ratsionalizator, No 11, Nov 62, p 1-2

The article contains the following passage:

"We like to talk about 'hidden sources.' But what about utilizing such well-known 'overt' sources as the timely introduction of inventions and improvements in industry? Here, we must admit honestly, not everything is well. It is known that the number of introduced suggestions for improvements has been decreased at one third of all the enterprises under the direction of the Supreme Council of the National Economy. During the past 6 months of this year, 30 sovnarkhozes, among which are the Belgorodskiy, Lipetskiy, Orlovskiy, Kurganskiy, Tomskiy, Kirgizskiy, Tadzhikskiy, and Tjrkmenkiy, have failed to introduce a single invention to industry."

## III. CONFERENCES

62. Recent Soviet Conferences in Engineering and Geophysics

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. It is assumed that there was no non-Soviet participation in the conference.

a. Second Conference Devoted to Methodological Problems of Satisfying Variable Electric Power Demands and to Peak Electric Power Stations; May 1962, Moscow; sponsored by the Power Engineering Institute imeni G. M. Krzhizhanovskiy, the Ministry of the Construction of Electric Power Stations USSR, the Main Power Engineering Administration under Gosplan USSR, and the Central Board and Moscow Oblast Branch of the Scientific-Technical Society of the Power Engineering Industry; third conference to be held in 1965. (Gidrotekhnicheskoye Stroitel'stvo, No 11, 1962, p 58)

b. Belorussian Republic Conference of Toolmakers; November/December 1962; sponsored by the State Committee of the Council of Ministers Belorussian SSR for Coordination of Scientific Research Work, the Belorussian Sovnarkhoz, the Ministry of Higher, Secondary Specialized, and Vocational Education of the Belorussian SSR, the Belorussian Board of the Scientific-Technical Society of the Machine Building Industry, and the All-Union Scientific-Research Instrument Institute. (Sovetskaya Belorussiya, 2 Dec 62, p 2)

c. 12th Scientific-Technical Conference on the Theory of Ships; no date given, Leningrad; sponsored by the Section on Ship Seaworthiness of the Central Board of the Scientific-Technical Society of the Shipbuilding Industry. (Sudostroyeniye, No 10, Oct 62, p 70)

d. Seventh Coordination Conference on Problems of On-Site Investigations of Hydroengineering Structures; 29-31 May 1962, Leningrad; sponsored by the All-Union Scientific-Research Institute of Hydraulic Engineering imeni Vedeneyev. (Gidrotekhnicheskoye Stroitel'stvo, No 11, 1962, p 59)

e. Coordination Conference on Problems of the Earthquake Proof Properties of Dams Made of Local Materials; 23-24 May 1962, Moscow; sponsored by the All-Union Scientific-Research Institute of Water Supply, Sewerage, Hydraulic Engineering, and Engineering Hydrogeology of the Academy of Construction and Architecture USSR. (Gidrotekhnicheskoye Stroitel'stvo, No 11, 1962, p 60)

f. Third All-Union Conference on Natural Laws Governing the Formation and Distribution of Endogenic Ore Deposits; 18-22 September 1962, Baku. (Bakinskiy Rabochiy, 23 Sep 62, p 3)

g. Fourth Transcaucasian Conference of Young Scientific Workers of Geological Institutes of the Academies of Sciences of Georgia, Azerbaijan, and Armenia; October 1962, Yerevan. (Kommunist, 28 Oct, 62 p 4)

h. Inter-Republic Scientific Session on Problems of the Utilization of the Arid Territories of Central Asia and Kazakhstan; 24-27 May 1962, Ashkhabad. (Vestnik Akademii Nauk SSSR, No 11, Nov 62, p 97)

i. All-Union Conference on the Active Struggle Against Hail Processes; 3-7 December 1962, Tbilisi; probably sponsored by the Institute of Geophysics of the Academy of Sciences Georgian SSR. (Zarya Vostoka, 4 Dec 62, p 4)

j. Conference on Problems of Climate Conversion; 11-13 June 1962, Leningrad; probably sponsored by the Main Geophysical Observatory imeni A. I. Voyeykov, the Institute of Geography, the Institute of Physics of the Atmosphere, and the Institute of Applied Geophysics. (Vestnik Akademii Nauk SSR, No 11, Nov 62, p 135)

k. Theoretical Conference on the Main Methodological Problems of the Development of the Science of the Earth and Transformation of Nature; 17 May 1962; sponsored by the Scientific Council on Philosophical Problems of Contemporary Natural Science. (Vestnik Akademii Nauk SSSR, No 11, Nov 62, p 138)

### 63. International Colloquium on Photogrammetry in Dresden

"International Photogrammetry Colloquium in Dresden"  
Budapest, Geodezia es Kartografia, Vo 14, No 5, 1962,  
p 390

The Photogrammetry Society of East Germany will hold an international colloquium on photogrammetry from 19 through 25 August 1963 at the Technical University of Dresden. Both the Polish Photogrammetry Society and the Hungarian Geodetic and Cartographic Association will participate in the arrangements for the event. Applications to read or lecture at the colloquium may be submitted to the aforelisted organizations no later than 15 December 1962.

A detailed program of the colloquium will be published in a subsequent issue, No 2, 1963, of this source.

\* \* \*



7 September 2004

Ms. Roberta Schoen  
Deputy Director for Operations  
Defense Technical Information Center  
7725 John J. Kingman Road  
Suite 0944  
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

A handwritten signature in dark ink, appearing to read "Sergio N. Alcivar".

Sergio N. Alcivar  
Chief, CIA Declassification Center,  
Declassification Review and Referral  
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)



## Processing of OGA-Held CIA Documents

The following CIA documents located at DTIC were reviewed  
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fldr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0343932	78-03117A	213	1	18	5117	Scientific Information Report Chinese Science (34)	10/22/1963	89	Approved For Release	3/29/2004
AD0344702	78-03117A	214	1	21	5149	Scientific Information Report Chinese Science (35)	11/4/1963	133	Approved For Release	3/29/2004
AD0344965	78-03117A	215	1	4	5163	Scientific Information Report Chinese Science (36)	11/7/1963	133	Approved For Release	3/29/2004
AD0345229	78-03117A	215	1	23	5182	Scientific Information Report Chinese Science (37)	11/18/1963	179	Approved For Release	3/29/2004
AD0345750	78-03117A	216	1	20	5209	Scientific Information Report Chinese Science (38)	12/11/1963	174	Approved For Release	3/29/2004
AD0344419	78-03117A	217	1	20	5241	Scientific Information Report Chinese Science (39)	12/27/1963	75	Approved For Release	3/29/2004
AD0346493	78-03117A	218	1	21	5277	Scientific Information Report Chinese Science (40)	1/10/1964	115	Approved For Release	3/29/2004
AD0346725	78-03117A	219	1	27	5320	Scientific Information Report Chinese Science (41)	1/27/1964	78	Approved For Release	3/29/2004
AD0347051	78-03117A	220	1	25	5359	Scientific Information Report Chinese Science (42)	2/6/1964	78	Approved For Release	3/29/2004
AD0347849	78-03117A	221	1	39	5407	Scientific Information Report Chinese Science (43)	3/2/1964	174	Approved For Release	3/29/2004
AD0347929	78-03117A	222	1	25	5438	Scientific Information Report Chinese Science (44)	3/5/1964	104	Approved For Release	3/29/2004
AD0348352	78-03117A	223	1	20	5479	Scientific Information Report Chinese Science (45)	3/20/1964	117	Approved For Release	3/29/2004
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AD0334103	78-03117A	188	1	37	4136	Scientific Information Report Electronics And Engineering (24)	12/20/1962	62	Approved For Release	3/29/2004
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AD0334769	78-03117A	193	1	39	4339	Scientific Information Report Electronics And Engineering (26)	2/28/1963	68	Approved For Release	3/29/2004
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